cording to the AHA/ACC Guidelines was appropriately performed in 89 (88%) of the patients, including 19 (18%) patients who underwent nuclear stress testing and 9 (9%) echocardiograms. Overall perioperative complications were; 7 (7%) CHF, 6 (6%) atrial fibrillation, 9 (9%) ischemia or MI and 2 (2%) deaths. Length of stay was 8.2 ± SD 6 days. Among the 19 patients that underwent nuclear stress testing 5 (26%) developed perioperatively CHF, MI, or ischemia. The 12 (12%) patients who did not receive further preoperative testing when indicated did not develop higher perioperative complications than the rest of the cohort.

No difference was found on individual or combined postoperative complications nor in length of stay among the physician groups performing the preoperative evaluation.

Conclusion: The results indicate that the ACC/AHA Preoperative Cardiovascular Guidelines are largely being followed at this hospital and that further non-invasive testing did not lower the perioperative events in this cohort.

1160-128 Prognostic Risk Stratification With SPECT Imaging: Results From a 20,340 Patient Multicenter Registry

D.S. Berman, R. Hachamovitch, L. Shaw, H.C. Lewin, A.E. Iskandrian, T. Bateman. *Cedars-Sinai and Tri-City Cardiac Outcomes Research Foundation, LA, CA, USA*

Background: Effective clinical decision making aimed at risk reduction requires use of accurate noninvasive tests that are able to stratify patients (pts) as to their rate of important cardiac outcomes.

Methods: 20,340 pts undergoing SPECT were prospectively enrolled from 3 institutions (follow-up = 1.8 ± 1 years). SPECT summed stress score (SSS) was derived from a 20-segment model incorporating severity/extent of perfusion defects: 60% = dual-isotope, 40% = Tl-201, 67% = exercise, 33% = pharmacologic stress imaging. Pooled data were compared for outcome differences using a random effects model correcting for internal validity with a corrected (2-sided) χ^2 test.

Results: Pts were on average = 63 yrs, 33% female. Annual cardiac death (CD) rates = 1.1%, myocardial infarction (MI) = 1.2%. Event rates by SSS:

Annualized Rates (% pts)	Cardiac Death	Myocardial Infarction
SS 0–3 (41%)	0.3%	0.4%
SS 4–8 (17%)	0.8%	1.5%
SS 9–13 (12%)	1.0%	1.2%
SS >13 (30%)	2.5%*	2.2%*

*p < 0.0001.

The annualized relative risk of CD and CD or MI was 4.8 (95% CI = 3.6–6.3) and 3.7 (95% CI = 3.1–4.5)-fold higher for pts with SSS >13. There was an 84% (95% CI = 75–90) and 82% (95% CI = 76–84) lower risk of CD and CD or MI in pts with SSS = 0–3.

Conclusion: Clinical decision making aimed at risk reduction employing medical and surgical interventions may be enhanced by the identification of cardiac risk on nuclear SPECT imaging.

1160-129 Increased Incidence of Adverse Events in Follow-up of Patients Not Previously Revascularized but who Have Abnormal SPECT Thallium Studies

W.A. VanDecker, P.M. McNelis, J. Kaspar, A. Iskandrian. *Allegheny University of the Health Sciences, Philadelphia, PA, USA*

Background. The excellent prognosis associated with a normal scintigraphy study is well documented. In an era of outcomes management, it is important to understand the implications of abnormal stress scintigraphy so the aggressiveness of management plans can be tailored appropriately.

Methods: We identified 209 patients in our database with abnormal SPECT thalliums from 6/94–6/96 and made follow-up phone inquiries about health status. The study population included 127 males, 82 females; age 66 ± 11; 153 hypertensives, 70 diabetics, 12 with history of myocardial infarction, of whom 84 exercised and 125 underwent pharmacologic stress. Mean follow-up was approximately 17 months. Study patients were identified with no history of previous coronary artery bypass grafting or balloon angioplasty and with no myocardial infarction within 2 months. Studies were scored abnormal with more than mild defects in 2 segments.

Results: During a mean follow-up of 17 months, there were 26 cardiac deaths (12%), 10 non-fatal myocardial infarctions (5%) and 52 (25%) coronary revascularizations. The annual hard event rate (death or infarction) was 12%/year.

Conclusions: Abnormal SPECT images in a previously non-revascularized population are associated with a high incidence of hard cardiac events and are frequently utilized in subsequent revascularization decision making.

1160-130 Prognostic Value of Quantitative Stress Myocardial SPECT Imaging in Patients With Unstable Angina

W.S. Hwang, A. Jafar, H.A. Dakik, Z.-X. He, E. Cwajg[1], J.J. Mahmarian, M.S. Verani. *Baylor College of Medicine, Houston, TX, USA; [1]Sponsored by CAPES, Brazil*

Recent guidelines have recommended noninvasive risk stratification of selected patients with unstable angina. However, there are scanty data on the prognostic significance of quantitative stress myocardial perfusion tomography (SPECT) in this patient population. We studied 137 consecutive patients admitted with a clinical diagnosis of unstable angina who underwent quantitative stress SPECT before hospital discharge.

During a mean follow-up of 27 ± 19 months, 22 patients (16%) sustained a hard cardiac event: cardiac death (n = 15) and non-fatal myocardial infarction (n = 7). By univariate analysis, predictors of subsequent hard events included a history of congestive heart failure (p = 0.006), an abnormal SPECT study (p = 0.031), the number of abnormal vascular territories on SPECT (p = 0.013), perfusion defect size ≥15% (p = 0.035) and a left ventricular ejection fraction <50% (p = 0.052). Perfusion defect size was significantly larger in patients with events than in those without events (21 ± 18% vs 11 ± 14%, p = 0.035). Age, gender, hypertension, prior history of myocardial infarction, number of coronary vessels with ≥50% stenosis or revascularization modality were not significantly associated with subsequent events. Multivariate Cox regression analysis identified 2 variables as independent predictors of prognosis: percent defect size ≥15% (p = 0.0027) and diabetes mellitus (p = 0.03).

In conclusion, quantitative SPECT provides independent prognostic information in patients with unstable angina pectoris.

1161 Novel Thrombolytic and Other Acute Therapies for Myocardial Infarction

Wednesday, April 1, 1998, 9:00 a.m.–11:00 a.m.
Georgia World Congress Center, West Exhibit Hall Level
Presentation Hour: 10:00 a.m.–11:00 a.m.

1161-149 Comparative Effects of Streptokinase and Liposome-encapsulated Streptokinase on Platelet Aggregation in Vitro

W.L. Daley, D.E. Lapsley, A.S. Janoff. *West Roxbury VA Medical Center and Harvard Medical School, Boston, MA; The Liposome Company, Princeton, NJ, USA*

Background: Streptokinase (SK) is an effective agent in reducing morbidity and mortality from acute myocardial infarction (MI). Since SK is a bacterial-derived protein, exposure to SK generally induces production of specific antibodies, some of which are capable of initiating platelet aggregation. The presence of these antibodies may limit the effectiveness of the drug and is responsible for the prohibition against retreating patients with SK after an initial exposure. Many experimental approaches have been made in an attempt to improve the pharmacologic and immunologic profile of SK. Recent reports have described the enhanced thrombolytic potency of liposome-encapsulated SK (Lipo-SK) in animal models of acute thrombosis when compared to standard SK.

Methods: In this study, we compared equivalent doses of SK and Lipo-SK for their capacity to induce platelet aggregation *in vitro*. These experiments were performed using platelet-rich plasma from fourteen individuals who had previously been treated with 1.5 million units of SK for acute myocardial infarction.

Results: SK in a dose of 5,000 u/ml induced platelet aggregation in 12 of 14 patient samples tested. In contrast, Lipo-SK failed to initiate platelet aggregation in any of the samples (p < 0.0001).

Conclusion: These data suggest that the packaging of streptokinase into liposome provides a vehicle for delivering drug that has retained thrombolytic properties while at the same time reduces the immunologically-based undesirable properties of the agent.

1161-150 Mechanical Thrombectomy Using the Angiojet Catheter in the Treatment of Acute Myocardial Infarction

J.A. Silva, S.R. Ramee, R. Kuntz, K. Dandreo, J. Popma. *For the VEGAS I and VEGAS II Investigators; New Orleans, LA, USA*

We studied the clinical and angiographic outcome of 89 pts with acute myocardial infarction (MI) treated with the Angiojet in a multicenter trial. All pts were treated within 24 hours of the clinical onset of MI. Mean age was

59 ± 11 years (69% males). History of previous MI was present in 45% of the pts and 13% presented with cardiogenic shock. The culprit lesion was located in the LAD (23%), RCA (37%), LCX (11%) or a saphenous vein graft (28%). Adjuntive percutaneous revascularization was performed in 93% of the patients: PTCA alone (46%), coronary stenting (46%), and rotational atherectomy (1%). Perecnt diameter stenosis was reduced from 82% to 50% after Angiojet, and to 24% after definitive treatment (P = 0.0001).

Procedural success, defined as the restoration of TIMI 3 flow and in-hospital freedom from death, emergent bypass surgery or major disabling stroke, was accomplished in 98%. Procedure complications included distal embolization (2%), transient no-reflow (2%), and abrupt closure (2%). At 1 month clinical follow up, 2 (2%) pts died; 3 (3%) patients had recurrent MI and 2 (2%) required repeated target vessel percutaneous revascularization. At 1 month follow up 82 (92%) patients were alive and free from recurrent MI and repeat revascularization procedure.

Conclusions: The Angrojet is a promising adjuntive device for establishing patency in thrombus laden lesions. It is of particular utility in acute myocardial infarction where the presence of coronary thrombi enhances the periprocedure complication rate.

1161-151 Liposomal PGE-1 Adjunctive Treatment for Acute Myocardial Infarction: Final Results of the LIFT Pilot Trial

R.W. Smalling, R.P. Karlsberg, R. Weiner, D.G. Ebersole, U. Thadani, E. Bates, G.B. Habib, D. Moliterno, Y.C. Park, J.J. Freitag. *For the LIFT Investigators; The University of Texas Medical School and Hermann Hospital, Houston, Texas, USA*

Background: Liposomal PGE-1 (TLC-C53) inhibited platelets and ICAM-1 expression which accelerated thrombolysis and reduced infarct size in animal myocardial infarction models.

Methods: To evaluate the effect of TLC-C53, an investigational drug, on thrombolysis and infarct salvage, 121 patients with myocardial infarction (MI) were randomized to receive either TLC-C53 (bolus plus 5 additional doses/48 hours) or placebo just prior to front-loaded t-PA. Coronary angiography was performed at 30, 60 and 90 minutes and 5–7 days after admission. Left ventriculography was performed acutely and 5–7 days post MI. Angiograms were analyzed for TIMI flow, global and regional left ventricular function.

Results: Patients were well matched for age, weight and time to treatment. There was a trend toward better early TIMI 3 patency in the TLC-C53 patients at 60 minutes post treatment (53 vs 47%, p = NS). However, at 90 minutes the TIMI 3 patency was equivalent (54 vs 55%). There was also a trend toward lower reinfarction and re-occlusion in the TLC-C53 group compared to placebo (2 vs 11% respectively; p = 0.06). There were no differences in acute or follow-up ejection fraction or regional function between the groups.

Conclusion: TLC-C53 did not produce dramatic improvements in infarct salvage or vessel patency at the dosage level and frequency evaluated however it may reduce recurrent ischemia and reinfarction.

1161-152 Phase I Safety Trial of Soluble Complement Receptor Type I (TP 10) in Acute Myocardial Infarction

G.J. Perry, P.R. Eisenberg, J.L. Zimmerman, J. Levin. *Birmingham Veterans Administration Medical Center, Birmingham AL; T Cell Sciences, Needham, MA, USA*

Background: Complement activation occurs in acute MI and may contribute to reperfusion injury. Thus complement inhibition might reduce injury following PTCA or thrombolysis for MI. This phase I trial tested the pharmacokinetics (PK) and safety of the complement inhibitor TP10 (T Cell Sciences, Needham, MA), a recombinant soluble form of human erythrocyte complement receptor 1.

Methods: TP10 was given by open label, ascending dose schedule (0.1, 0.3, 1, 3, or 10 mg/kg i.v. over 30 min.) to 24 patients receiving lytics (n = 9) or primary PTCA (n = 15) for first MI. CH50, C3a, and C4a were measured at 0, 8, 24, 48, and 168 hr.

Results: There were no immunogenic responses or serious adverse effects directly attributed to TP10. Non-compartmental PK analysis showed TP10 $t_{1/2}$ = 94.5 ± 57.5 hr. TP10 caused dose ($p < 0.05$ for 0.1 vs higher doses) and time-dependent ($p < 0.05$ for 8 and 24 hr vs 0 and 168 hr) decrease of CH50 (2 way ANOVA). C3a tended to fall at 8 h relative to 0 h (p = ns) at all TP10 doses, in contrast to the predicted rise with MI, suggesting complement inhibition. As expected based on the mechanism of action of TP10, there was no time or dose effect on C4a. In patients receiving lytics there was a trend toward lower CKMB (normalized to ECG area at risk) in those receiving higher (≥1.0 mg/kg) vs lower dose TP10 (52 vs 511, p = 0.06).

Conclusion: TP10 is well tolerated and non-immunogenic in MI. The expected rise in C3a during MI was not seen at any dose of TP10, suggesting effective complement suppression in these patients.

1161-153 A K^+-ATP Channel Opener, Nicorandil, Limited Infarct Size in Patients With Acute Myocardial Infarction

Y. Sakata, K. Kodama, A. Hirayama, M. Kitakaze, M. Hori. *Osaka Police Hospital, Osaka; Osaka University, Suita, Japan*

Background: We have recently reported that nicorandil (NCR), a K^+-ATP channel opener, restored blood flow to the reperfused myocardium in patients (pts) with acute myocardial infarction (AMI). However, it is unknown about the infarct size-limiting effect of NCR. Thus we sought to investigate whether NCR limit infarct size in pts with their first anterior AMI.

Methods: After successful coronary reflow, 15 pts received intracoronary administration of NCR (2 mg), and 18 pts received placebo. Peak serum creatine kinase (CK) levels, defect volume index (DVI) determined by thallium-201 SPECT, global ejection fraction (EF) and left ventricular end-diastolic volume index (EDVI) in the acute stage and one month after the onset were compared between the two groups of patrients.

Results: 1) There were no differences between the two groups in age, gender and time to reperfusion (4.2 ± 2.2 vs 4.6 ± 1.8 hrs, p = 0.64). 2) Peak CK (2248 ± 1386 vs 3642 ± 1624 U/L, p = 0.03) and peak CK-MB (191 ± 118 vs 303 ± 122 U/L, p = 0.03) levels were significantly lower in NCR group. 3) DVI was significantly lower in NCR group (961 ± 735 vs 1557 ± 781 U, p = 0.05). 4) EF was significantly improved in a month in NCR group (42 ± 14 to 52 ± 16%, p = 0.03), while it was not in placebo group (44 ± 11 to 47 ± 13%, p = 0.26). 5) EDVI did not differ both at the acute stage and a month after the onset.

Conclusion: Intracoronary administration of NCR limited infarct size and improved functional recovery in a month after the onset. Thus intracoronary nicorandil administration seems to be a useful adjunctive therapy following successful coronary reperfusion in patients with AMI.

1162 Diagnostic Methods of Detecting Ischemia

Wednesday, April 1, 1998, 9:00 a.m.–11:00 a.m.
Georgia World Congress Center, West Exhibit Hall Level
Presentation Hour: 10:00 a.m.–11:00 a.m.

1162-131 Beneficial Effects of Troglitazone in Vasospastic Angina Pectoris With Diabetes Mellitus

T. Murakami, Y. Arai, B. Kaku. *Fukui Cardiovascular Center, Fukui, Japan*

Backgrounds: The relationships between insulin resistance and coronary artery disease have a great deal of attention.

Methods: In order to investigate whether troglitazone, recently used for insulin resistance, has impacts upon clinical manifestations of coronary artery disease we administered troglitazone for four months in diabetic patients with angiographically documented coronary vasospasm and residual angina pectoris even with conventional medications for vasospastic angina pectoris (n = 8). At baseline and at four months after medication, we assessed anginal episodes and non-invasively measured the reactive changes in lumen diameter of right brachial artery following transient occlusion for five minutes (FMD; flow-mediated endothelium-dependent vasodilation), and after sublingual administration of (300 μg) glyceril trinitrate (GTN; endothelium-independent vasodilation).

Results: Duration of anginal episodes (AP; minutes per month) were significantly reduced after medication. FMD was improved after medication, GTN was similar before and after medication. Reduction of AP was correlated to improvement of FMD (r = 0.6, p < 0.01).

	premedication	postmedication	p value
AP	72 ± 68	14 ± 17	0.04
FMD	4.3 ± 1.4%	6.6 ± 1.6%	0.03
GTN	11.5 ± 4.3%	13.3 ± 2.9%	n.s.

Conclusions: These findings suggest that troglitazone improves endothelium-dependent vasoreactivities and reduces anginal episodes in diabetic patients with vasospastic angina pectoris, and insulin-resistance may contribute to clinical manifestation of vasospastic angina pectoris with diabetes mellitus.